

CMPS 101
Summer 2008
Homework Assignment 6

1. (1 Point) p.1091: B.5-4

Use induction to show that a nonempty binary tree with n nodes has height at least $\lfloor \lg n \rfloor$. Hint: use the recursive definition of height discussed in class:

$$h(T) = \begin{cases} -\infty & n(T) = 0 \\ 0 & n(T) = 1 \\ 1 + \max(h(L), h(R)) & n(T) > 1 \end{cases}$$

Here $n(T)$ denotes the number of nodes in a binary tree T , $h(T)$ denotes its height, L denotes its left subtree, and R its right subtree. Note that this proof can be phrased equally well as an induction on $n(T)$ or on $h(T)$.

2. (1 Point) p.132: 6.2-5

The code for Max-Heapify is quite efficient in terms of constant factors, except possibly for the recursive call in line 10, which might cause some compilers to produce inefficient code. Write an efficient Max-Heapify that uses an iterative control construct (a loop) instead of recursion.